

REPLACED BY
ART 34 AMDT

WO 01/12523

531 Re

10/018675

PCT/NL00/00423

19 DEC 2001

METHOD OF SEPARATELY PACKAGING DIFFERENT KINDS OF FOOD AND PACKAGE THEREFORE

5 BACKGROUND OF THE INVENTION

Field of the invention

10 The invention relates to a working method for separately packaging various types of food in a single package, comprising: placing food on a tray with various compartments that are open on one side with one type of food placed in each compartment after which a film structure is placed above the open sides of the compartments, whereby above each compartment a part of the film structure is placed, followed by fastening the film structure on the tray around the open sides of the compartments. The term film structure can be understood to mean either one single film or a combination of various films on and/or beside each other, as well as film with a substance or a sticker on it.

15 Such packages are usually intended to allow consumers to quickly and easily prepare their own meals. Many or all of the necessary ingredients are present so that the consumer himself need not buy all the ingredients separately.

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Prior art

25 Such a working method is known from European patent no. 0 293 794 B1. In this known working method various types of food are packaged in a single package. To improve the shelf life of the various types of food, in the known working method the various types of food are stored under different atmospheric conditions. Some types of food are preferably stored in an oxygen-low environment while others instead are better stored in an atmosphere that is rich in oxygen. To this end, in the known working method the option exists of introducing preservative gases into the package during packaging in the various compartments of the package. In the known working method the possibility also exists of creating overpressure, underpressure, or a vacuum in one or more of the compartments during packaging.

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Summary of the invention

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5 An objective of the invention is to provide a working method of the type described in the preamble for the packaging of various types of food in a single package, in which even better individual circumstances can be created for the various types of food than with the known working method. To this end the working method according to the invention is characterized by the fact that the film structure is composed and/or processed such that the characteristics of at least some of the specified parts of the film structure are different from each other. This creates circumstances for the food in the package that are even better adapted per type of food. For example the space in a compartment of the package can be fully sealed off from the outside environment by an gas-impermeable part of the film structure, or indeed interacting with the outside environment by way of a gas-permeable part of the film structure.

15 The differences between the characteristics of the parts of the film structure are preferably different in a material sense, for example gas permeability, which factors have an influence upon the condition of the food in the compartments. The imprinting of parts of a transparent film with ink has little or no effect on the condition of the food so there is hardly a difference from the parts of the film which are not imprinted.

20 By utilizing a differentiated film structure in which the closure of each compartment can be coordinated with the type of food present in the compartment and the condition of the food, an optimal environment can be created for the food. In this way even in a package where no separate gas atmospheres are present in the compartments good circumstances can nonetheless be obtained for the food.

25 An embodiment of the working method according to the invention is characterized by the fact that in the composition and/or processing of the film structure in at least a number of the specified parts an active element can be introduced into the film structure. The term active element should be understood to mean an element that reacts with substances in the food or substances that are emitted by the food.

30 Preferably the active element in the form of an active substance is placed in and/or on the parts of the film structure. For example the substance might be a material that reacts with the oxygen in the compartment and thus removes the oxygen from the compartment and the food. This is desirable for those types of food that can be stored best

in a low-oxygen atmosphere, for example for the protection of flavor and aroma against oxidation. Such substances are generally known, for example films that contain iron powder. The iron powder rusts and oxygen is withdrawn from the food and the atmosphere in the compartment. Instead of iron powder ascorbic acid or sulphite can also be used as an active substance. These substances, too, oxidize and oxygen is withdrawn from the food and the atmosphere in the compartment. In addition, enzymatic-acting substances can be applied to the film, such as glucose oxidase or ethanol oxidase in which enzymes are catalysts for an oxygen-consuming reaction.

The substance can also be a material, for example, that absorbs oxygen, for example a film of nylon polymer in which cobalt is present for a cobalt-catalyzed oxidation of the nylon polymer. Instead of, or in addition to, oxygen-absorbing substances, the film or sticker can also contain CO₂ absorbing or emitting substances, or ethylene absorbing substances, ethanol emitting substances, moisture-absorbing substances, etc. All of these substances are generally known.

The active element can also be formed by applying a film structure that is activated upon radiation. By only radiating a number of the parts of the film structure, a film structure with varying characteristics is created. The material of the film structure should in this case be such that its characteristics can be changed by radiation or because certain substances in the material of the film structure can be activated by radiation. For example the material of the film structure can discolor in response to radiation and form a light barrier. In addition, as a result of radiation the material can be activated such that for example it obtains the characteristic that it reacts to oxygen and thus removes the oxygen from the compartment. Such a film is known from European patent application EP-A 0 520 257. This known film contains a combination of an oxidizable organic compound and a metallic transference catalyst. Here oxidation of the organic compound can be initiated by radiation. The manner of radiating is known from the international patent application WO 99/21699. Through this reference both documents are included in the present patent application. In this way food can be packaged both in a low-oxygen environment and a high-oxygen environment in a single package.

Processing the film structure can comprise for example placing perforations in at least a number of the parts of the film structure, for example to allow the food to breathe. The size of the perforations or the number of perforations can be adjusted

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depending on the degree of respiration of the food. A film with microperforations can also be used.

A further embodiment of the working method according to the invention is characterized in that at the composition and/or processing of the film structure in at least one of the parts of the film structure, a passive element is introduced that manipulates radiation. Under a passive element that manipulates radiation one should think of an element that can resist radiation - for example microwaves in a microwave oven - reflect them, redistribute them, or absorb them and convert them into heat. For example an aluminum film can modify the field in a microwave such that the capacity in the microwave unit is redistributed and even heating is obtained. Materials that can absorb microwave energy and convert it into heat are, for example, aluminum, stainless steel and inconel.

The composition of the film structure can for example take place by using first one film and then on parts of that film placing a second film or sticker. The second film or sticker can for example contain the above-mentioned active substance or consist of one of the above-mentioned materials that influence radiation. Or the first film can be perforated and the second film or sticker can be gas impermeable and seal off parts of the first film.

The film structure can also be composed for example by fastening two films to each other, after which one of the films is locally removed. The one film can for example be perforated and the other film can be a gas-impermeable film that is placed in separate parts on the perforated film. Parts of the gas-impermeable film can for example be peeled off the perforated film.

Yet another method of composing the film structure can for example be to place two or more films with different characteristics beside each other on the tray. For example the various films can contain an active substance, be perforated, be made of a radiation-influencing material, or be gas impermeable. Possibly the films can first be connected with each other before being placed on the tray.

The composition and/or processing of the film structure preferably takes place before food is placed on the tray. This decreases the chance that waste materials that may occur during the processing end up in the food.

Another favorable embodiment of the working method according to the invention is characterized in that, before the film structure is composed and/or processed, first the characteristics of the food are determined, after which the composition and/or

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processing of the film structure takes place according to the characteristics of the food. Thus the conditions under which the food is stored can be better coordinated with the actual condition of the food. For example, if the respiration of the food is high, it may be desirable that the space in the compartment be more connected with the environment, such that a film structure with high permeability is desirable.

The invention also relates to a package manufactured according to the working method according to the invention comprising a tray with various compartments in which various types of food are present, with one type of food in each compartment, which compartments are closed off by a film structure that is connected to the tray around the openings of the compartments, where above each compartment part of the film structure is present.

As far as the package is concerned the invention is characterized in that the characteristics of at least some of the parts of the film structure are different. For example in at least some of the parts of the film structure there can be perforations, in and/or on at least a number of parts of the film structure an active element or active substance can be present, or at least in a number of parts of the film structure a passive element can be present that manipulates radiation.

In addition, the various characteristics can be acquired because the film structure is comprised of various films, for example a first film and a second film or a sticker that is present on parts of the first film, or two or more films beside each other with different characteristics.

Brief description of the drawings

The invention will be elucidated more fully below on the basis of drawings in which embodiments of the working method and the package according to the invention are shown. In these drawings:

- Figure 1 shows an embodiment of the package according to the invention in a top view;
- Figure 2 shows the illustration in Figure 1 as a cross-section;
- Figure 3 shows a diagram of a first embodiment of the working method according to the invention;

Figure 4 shows a diagram of a second embodiment of the working method according to the invention;

Figure 5 shows a first embodiment of the composition of the film structure; and

5 Figure 6 shows a second embodiment of the composition of the film structure.

Detailed description of the drawings

10 In Figures 1 and 2 an embodiment of the package according to the invention is shown in a top view respectively cross-section along line A-A. The package 1 is comprised of a tray 3 that has various compartments 5, 7, and 9 that are open on top. The compartments are closed off by a film structure 11 that is fastened via sealing seams 13 to flanges 15 of the tray 3.

15 In the compartments 5, 7, 9 there are various types of food 17, 19. For each type of food an optimal closure of the compartment is present, because the film structure 11 is divided into various parts 21, 23, 25, that have different characteristics and each close off a compartment. For example part 21 and parts 23 and 25 form individual films 27 en 29 that are fastened side by side on the tray. Films 27 and 29 are for example transparent gas-impermeable films. To obtain optimal conditions in the compartments, for example, part 23 of the film 29 is provided with perforations 31 and another part 25 of the film 29 has a non-transparent sticker 33 that seals off the space in the compartment against light.

20 To further improve the conditions under which the various types of food are packaged, various preservative gases 35, 37 can be introduced into the compartments.

25 Figure 3 is a diagram showing a first embodiment of the working method according to the invention for packaging different types of food in a single package. Here in a separate production process 41 the film structure 43 is manufactured. In this production process 41 various films 45, 47 can be fastened on or on top of each other and/or the film structure can be processed. The fastening and/or the processing takes place in a machine 49.

30 The film structure 43 is then brought into a further production process 51. In this production process 51 trays 53 are filled with different types of food 55, 57. Then the film structure 43 is brought above the open side of the tray 53. Then the film structure 43

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is sealed on the tray 53 by melting the film structure 43 to the tray 53 with a heated sealing stamp 59.

Figure 4 is a diagram showing a second embodiment of the working method according to the invention. Here the process of composing and/or processing the film structure is integrated into the process of filling the trays and the fastening of the film structure to the trays. After filling the compartments of the tray 53 with different types of food 55, 57 the condition of the food is measured. Depending on the conditions the machine 49 is set. In this manner for example the number of perforations per surface unit can be set. Thus the package can be even better coordinated with regard to the type of food being packaged.

The film structure can be comprised in various ways. Figure 5 shows a first embodiment of the composition of the film structure and placement on a tray. Here the two different films 61 and 63 form, side by side, the film structure 65, and each film seals off one or more compartments of the tray 67.

Figure 6 shows a second embodiment of the composition of the film structure. Here two different films 71 and 73 are fastened to each other and form a film structure. The film structure thus formed 75 possesses different parts 77 and 79 to seal off different compartments of the trays 81.

Although the invention is explained above on the basis of drawings, it should be stressed that the invention is in no way limited to the embodiments shown in the drawings. The invention also extends to all embodiments deviating from the embodiments shown in the drawings within the context defined by the claims.

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